

CLAIMS

What is claimed is:

- 1 1. An apparatus, comprising:
2 a Micro-electromechanical System (MEMS) module including at least one
3 MEMS device;
4 at least one contact mounted to a bottom of the MEMS module; and
5 at least one via to pass vertically through a portion of the MEMS module to
6 electrically couple the at least one MEMS device to the contact.
- 1 2. The apparatus of claim 1 wherein the at least one MEMS device comprises a
2 MEMS RF switch array including at least one switch.
- 1 3. The apparatus of claim 1 wherein the MEMS module includes an input
2 terminal, an output terminal, and an actuation terminal each electrically coupled to
3 the at least one MEMS device.
- 1 4. The apparatus of claim 3 wherein the input terminal is electrically coupled to a
2 first via of the at least one via, the output terminal is electrically coupled to a second
3 via of the at least one via, and the actuation terminal is electrically coupled to a third
4 via of the at least one via.

1 5. The apparatus of claim 4 wherein the first via is electrically coupled to the first
2 contact, the second via is electrically coupled to a second contact mounted to the
3 bottom of the MEMS module, and the third via is electrically coupled to a third
4 contact mounted to the bottom of the MEMS module.

1 6. The apparatus of claim 1, further comprising a trace ring to couple the at least
2 one MEMS device to a first via of the at least one via.

1 7. The apparatus of claim 6 wherein the trace ring surrounds at least a portion of
2 the at least one MEMS device to allow a signal to transit the MEMS module using a
3 second via of the at least one via without crossing the trace ring.

1 8. The apparatus of claim 1, further comprising a seal ring to couple a first
2 section to a second section of the MEMS module.

1 9. The apparatus of claim 1, further comprising a printed circuit board (PCB)
2 coupled to the contact.

1 10. A Micro-electromechanical System (MEMS) Radio Frequency (RF) switch
2 module, comprising:

3 a MEMS die including an RF switch array;

4 a cap section coupled to the MEMS die, the cap section including at least one
5 vertical via to pass through the cap section.

1 11. The MEMS RF switch module of claim 10 wherein the cap section is coupled
2 to the MEMS die by a seal ring.

1 12. The MEMS RF switch module of claim 10 wherein the cap section comprises
2 Silicon.

1 13. The MEMS RF switch module of claim 10 wherein the cap section comprises
2 a ceramic material.

1 14. The MEMS RF switch module of claim 10 wherein the MEMS die comprises:
2 an input terminal electrically coupled to the RF switch array and to a first
3 vertical via of the at least one vertical via;
4 an output terminal electrically coupled to the RF switch array and to a second
5 vertical via of the at least one vertical via; and
6 an actuation terminal electrically coupled to the RF switch array and to a third
7 vertical via of the at least one vertical via.

1 15. The MEMS RF switch module of claim 14 wherein the MEMS die comprises a
2 second RF switch array electrically coupled to a second input terminal and to a
3 second actuation terminal, the second RF switch array electrically coupled to the
4 output terminal.

1 16. The MEMS RF switch module of claim 10, further comprising a trace ring to
2 electrically couple a first vertical via of the at least one vertical via to the RF switch
3 array.

1 17. The MEMS RF switch module of claim 16 wherein the trace ring surrounds at
2 least a portion of the RF switch array to allow a signal to enter or exit the MEMS RF
3 switch module by way of a second vertical via of the at least one vertical via without
4 crossing the trace ring.

1 18. The MEMS RF switch module of claim 10, further comprising a printed circuit
2 board (PCB) electrically coupled to the RF switch array by way of the at least one
3 vertical via.

1 19. A system, comprising:
2 a printed circuit board (PCB);
3 a Micro-electromechanical System (MEMS) Radio Frequency (RF) switch
4 module coupled to the PCB, the MEMS RF switch module comprising:
5 an RF switch array; and
6 at least one vertical via to electrically couple the RF switch array
7 to the PCB; and
8 an amplifier electrically coupled to the MEMS RF switch module.

1 20. The system of claim 19 wherein the system is a wireless device.

1 21. The system of claim 19 wherein the MEMS RF switch module to switch from
2 a first RF band to a second RF band to transmit an RF signal by the system.

1 22. The system of claim 19 wherein the MEMS RF switch module comprises a
2 trace ring to electrically couple the RF switch array to a first vertical via of the at least
3 one vertical via, the trace ring surrounding at least a portion of the RF switch array to
4 allow a signal to transit the MEMS RF switch module using a second vertical via of
5 the at least one vertical via without crossing the trace ring.

1 23. A method, comprising:
2 receiving a Radio Frequency (RF) signal at a Micro-electromechanical
3 System (MEMS) Radio Frequency (RF) switch module through a first vertical via of
4 the MEMS RF switch module, the first vertical via electrically coupled to an RF
5 switch array of the MEMS RF switch module;
6 transiting the RF signal through at least one switch of the RF switch array;
7 and
8 outputting the RF signal from the MEMS RF switch module.

1 24. The method of claim 23 wherein outputting the RF signal comprises
2 outputting the RF signal through a second vertical via of the MEMS RF switch
3 module, the second vertical via electrically coupled to the RF switch array.

1 25. The method of claim 23, further comprising receiving an actuation signal at
2 the MEMS RF switch module to actuate the at least one switch.

1 26. The method of claim 25 wherein receiving the actuation signal comprises
2 receiving the actuation signal through a third vertical via of the MEMS RF switch
3 module, the third vertical via electrically coupled to the RF switch array.